



# UNITED STATES PATENT AND TRADEMARK OFFICE

A

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,420	04/08/2004	Evan Reed	MIT9682CIP	7829
55740	7590	12/27/2005	EXAMINER	
GAUTHIER & CONNORS, LLP			LEE, JOHN D	
225 FRANKLIN STREET			ART UNIT	
BOSTON, MA 02110			PAPER NUMBER	
			2874	

DATE MAILED: 12/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/820,420

Applicant(s)

REED ET AL.

Examiner

John D. Lee

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-21 is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_ is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>0404,0704,1004</u> . | 6) <input type="checkbox"/> Other: ____  |

The formal drawings submitted on October 21, 2004, are acceptable.

The specification is objected to because of the following minor informalities. On page 1, in the section labeled "**PRIORITY INFORMATION**", indication should be made that U.S. Patent Application Serial Number 10/412,089 has issued as U.S. Patent Number 6,809,856. Applicant's cooperation is requested in correcting any other errors of which applicant may become aware in the specification.

Claims 3, 4, 10, 11, 13-15, 17 and 18 are objected to because of the following minor informalities. The last word of claim 3 should be "medium" rather than "material". The last word of claim 4 should be "medium" rather than "region". The last word of claim 10 should be "medium" rather than "material". The last word of claim 11 should be "medium" rather than "region". Claim 13 is word-for-word identical to claim 6. It is therefore believed that claim 13 is intended to depend from claim 8 rather than from claim 1. Claim 14 is word-for-word identical to claim 7. It is therefore believed that claim 14 is intended to depend from claim 8 rather than from claim 1. In line 1 of claim 15, the word "medium" should be inserted after "nonlinear". The last word of claim 17 should be "medium" rather than "material". The last word of claim 18 should be "medium" rather than "region". Appropriate correction is required.

Claims 1-21 are allowed. The prior art fails to disclose or reasonably suggest the claimed frequency conversion method and device, wherein a moving grating is formed in a nonlinear medium by introducing at opposite ends thereof a set of electromagnetic radiation having varying frequencies, inputting an electromagnetic radiation signal at a first frequency into the nonlinear medium, and extracting a converted frequency of

Art Unit: 2874

electromagnetic radiation from the nonlinear medium. The most relevant prior art has been submitted by applicant, but does not disclose or suggest this "shock wave" method of frequency conversion in a nonlinear medium. For example, The IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES article by Scherbatko et al discloses a very similar technique for wavelength shifting (frequency conversion), but specifically states on page 726 that "*the wavelength conversion technique reported here does not rely on nonlinear properties of the semiconductor medium to implement a moving refractive index grating*". Other bits and pieces of the claimed method and device are disclosed by the cited prior art, but none of the references discloses or suggests the totality thereof. The claims are therefore allowed.

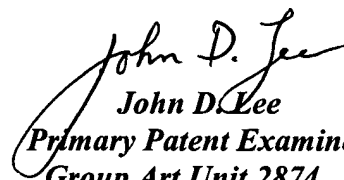
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. As just mentioned, the most relevant prior art is represented by the documents submitted by applicant in the Information Disclosure Statements received on April 8, 2004; July 14, 2004; and October 7, 2004. All of these documents have been considered and made of record (note the attached copy of forms PTO-1449). The sole prior art document cited by the Examiner (U.S. Patent 6,809,856 to Reed et al) is the Patent which has matured from applicant's parent application Serial Number 10/412,089, filed April 11, 2003.

This application is in condition for allowance except for the following formal matters: the objections to the claims and specification as outlined above.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO (2) MONTHS** from the mailing date of this letter.

Any inquiry concerning the merits of this communication should be directed to Examiner John D. Lee at telephone number (571) 272-2351. The Examiner's normal work schedule is Tuesday through Friday, 6:30 AM to 5:00 PM. Any inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at telephone number (571) 272-1562, to the technical support staff supervisor (Team 8) at telephone number (571) 272-1564, or to the Technology Center 2800 Customer Service Office at telephone number (571) 272-1626.

  
**John D. Lee**  
**Primary Patent Examiner**  
**Group Art Unit 2874**